



Massachusetts Comprehensive Assessment System Chemistry Formula and Constants Sheet

Common Polyatomic Ions

Ion	Ionic Formula
Ammonium	NH_4^+
Carbonate	CO_3^{2-}
Hydroxide	OH^-
Nitrate	NO_3^-
Phosphate	PO_4^{3-}
Sulfate	SO_4^{2-}

Combined Gas Law: $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

Ideal Gas Law: $PV = nRT$

Dilution Formula: $M_1 V_1 = M_2 V_2$

Molar Volume of Ideal Gas at STP: 22.4 L/mol

Ideal Gas Constant: $R = 0.0821 \text{ L} \cdot \text{atm/mol} \cdot \text{K} = 8.31 \text{ L} \cdot \text{kPa/mol} \cdot \text{K}$

STP: 1 atm (101.3 kPa), 273 K (0°C)

Absolute Temperature Conversion: $K = ^\circ\text{C} + 273$

Definition of pH: $\text{pH} = -\log [\text{H}_3\text{O}^+] = -\log [\text{H}^+]$

Avogadro's Number: 6.02×10^{23} particles/mol

Nuclear Symbols

Name	Symbol
Alpha particle	α or ${}^4_2\text{He}$
Beta particle	β or ${}^0_{-1}e$
Gamma ray	γ
Neutron	1_0n



Massachusetts Comprehensive Assessment System

Periodic Table of the Elements

Period

Group (Family)

1A
1

2A
2

3A
13

4A
14

5A
15

6A
16

7A
17

8A
18

Key:

atomic weight

Symbol

atomic number

Name

1.01

H

1

Hydrogen

6.94

Li

3

Lithium

9.01

Be

4

Beryllium

22.99

Na

11

Sodium

24.31

Mg

12

Magnesium

39.10

K

19

Potassium

40.08

Ca

20

Calcium

44.96

Sc

21

Scandium

47.88

Ti

22

Titanium

50.94

V

23

Vanadium

52.00

Cr

24

Chromium

54.94

Mn

25

Manganese

55.85

Fe

26

Iron

58.93

Co

27

Cobalt

58.69

Ni

28

Nickel

63.55

Cu

29

Copper

65.39

Zn

30

Zinc

69.72

Ga

31

Gallium

72.59

Ge

32

Germanium

74.92

As

33

Arsenic

78.96

Se

34

Selenium

79.90

Br

35

Bromine

83.80

Kr

36

Krypton

85.47

Rb

37

Rubidium

87.62

Sr

38

Strontium

88.91

Y

39

Yttrium

91.22

Zr

40

Zirconium

92.91

Nb

41

Niobium

95.94

Mo

42

Molybdenum

(98)

Tc

43

Technetium

101.07

Ru

44

Ruthenium

102.91

Rh

45

Rhodium

106.42

Pd

46

Palladium

107.87

Ag

47

Silver

112.41

Cd

48

Cadmium

114.82

In

49

Indium

118.71

Sn

50

Tin

121.75

Sb

51

Antimony

127.60

Te

52

Tellurium

126.91

I

53

Iodine

131.29

Xe

54

Xenon

132.91

Cs

55

Cesium

137.33

Ba

56

Barium

178.49

Hf

72

Hafnium

180.95

Ta

73

Tantalum

183.85

W

74

Tungsten

186.21

Re

75

Rhenium

190.23

Os

76

Osmium

192.22

Ir

77

Iridium

195.08

Pt

78

Platinum

196.97

Au

79

Gold

200.59

Hg

80

Mercury

204.38

Tl

81

Thallium

207.2

Pb

82

Lead

208.98

Bi

83

Bismuth

(209)

Po

84

Polonium

(210)

At

85

Astatine

(222)

Rn

86

Radon

(223)

Fr

87

Francium

(226)

Ra

88

Radium

(267)

Rf

104

Rutherfordium

(268)

Db

105

Dubnium

(271)

Sg

106

Seaborgium

(272)

Bh

107

Bohrium

(277)

Hs

108

Hassium

(276)

Mt

109

Meitnerium

(281)

Ds

110

Darmstadtium

(280)

Rg

111

Roentgenium

138.91

La

57

Lanthanum

140.12

Ce

58

Cerium

140.91

Pr

59

Praseodymium

144.24

Nd

60

Neodymium

(145)

Pm

61

Promethium

150.36

Sm

62

Samarium

151.96

Eu

63

Europium

157.25

Gd

64

Gadolinium

158.93

Tb

65

Terbium

162.50

Dy

66

Dysprosium

164.93

Ho

67

Holmium

167.26

Er

68

Erbium

168.93

Tm

69

Thulium

173.04

Yb

70

Ytterbium

174.97

Lu

71

Lutetium

232.04

Th

90

Thorium

231.04

Pa

91

Protactinium

238.03

U

92

Uranium

(237)

Np

93

Neptunium

(244)

Pu

94

Plutonium

(243)

Am

95

Americium

(247)

Cm

96

Curium

(247)

Bk

97

Berkelium

(251)

Cf

98

Californium

(252)

Es

99

Einsteinium

(257)

Fm

100

Fermium

(258)

Md

101

Mendelevium

(259)

No

102

Nobelium

(262)

Lr

103

Lawrencium

Mass numbers in parentheses are those of the most stable or most common isotope.

Lanthanide Series

Actinide Series

Mass numbers in parentheses are those of the most stable or most common isotope.